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November 4, 1992

Office of the Secretary
ATT: Ms. Donna Searcy
Federal Communications Commission
1919 M Street, NW
RM. 222
Washington, DC 20554

Subject: Comments Regarding GEN Docket 90-314 & ET 92-100

Dear Ms. Searcy,

ROLM is pleased to present the enclosed comments (1 original, 11 copies) relating to the Notice of Proposed Rule Making and Tentative Decision, GEN Docket 90-314 and ET 92-9. We would like these comments to be considered during the Commission's deliberations on the rulings to be enacted which will impact these new wireless services.

Sincerely,
ROLM

Steven Sivitz
Program Manager - Wireless Systems

Enc. 12

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List A B C D E

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of:	)	GEN. Docket 90-314
Amendment of the Commission's	)	ET Docket 92-100
Rules to Establish New Personal	)	
Communications Services	)	

Comments of ROLM

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ROLM Comments

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Summary

As industry and government continue to work together to institute a new era of radio based communications, there are many unresolved issues slowing the availability of new services. The most pressing revolve around the frequency allocations. How much spectrum should the various services receive and closely coupled to this are the licensing mechanisms -- licensed or unlicensed operations. Beginning with its earliest filings, ROLM has advocated sufficient spectrum for current and future applications. Substantial data has been presented to the FCC indicating the allocation requirements for unlicensed devices. The proposed allocation is unquestionably inadequate.

There is a general consensus within the telecommunications industry, that the business environment will be the incubator for emerging personal communications technology, services and pricing. ROLM believes that wireless telecommunications has a significant place in the future of business communications. Wireless telephones will enhance productivity, responsiveness and competitiveness in the business environment. This market requires an unlicensed structure to facilitate the introduction and growth of the industry.

In order for wireless business services to be implemented, the Federal Communications Commission needs to provide the regulatory guidelines which accommodate a variety of unlicensed applications while assuring that users are protected from spectrum abuse and uncontrollable interference. The technical parameters should be initiated by the industry and not dictated by regulatory fiat.

Additionally, a truly competitive environment needs to be developed that fosters creativity, but does not dilute profitability. The structure of the competitive environment must place all players on a level playing field. Besides inequitable starting positions, another handicap to a competitive market is the addition of unnecessary costs related to license speculation.

The ultimate desire is for a timely resolution to the regulatory debates, so that all interested parties can focus on advancing the wireless opportunities. A proactive Commission is essential to directing the nation's resources towards continued worldwide communications leadership.

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Comments of ROLM

I. Introduction

ROLM is pleased to comment on certain topics relating to the above captioned proceeding. As the third largest American manufacturer of private business exchanges, ROLM believes it can assist the Federal Communications Commission (FCC or Commission) by providing insight into particular issues relevant to personal communications in the business environment. ROLM has committed resources to technology research and development, regulatory proceedings, industry associations and most importantly customer interaction.

The emergence of the personal communications services (PCS) industry bodes well for both providers and consumers of new wireless communications. ROLM is proud of its history of innovative product offerings, such as digital exchanges,

PhoneMail® and call centers, and is committed to providing this newest generation of communications technology.

The vast array of business decisions associated with the evolution of PCS are influenced and paced by the Commission's rulings in this proceeding. In addition to impacting the domestic services, these decisions will affect the industry's competitiveness and timeliness in worldwide markets. Within these comments, ROLM will focus on the primary items believed to have the most relevance to allocating spectrum for "User-provided"[1] PCS (U-PCS).

ROLM's analysis of the pending regulatory actions, highlight the following topics as critical to U-PCS:

- Unbundling PCS
- FCC support for unlicensed devices - spectrum etiquette
- Number of PCS licensees
- Spectrum allocation for unlicensed devices
- Unlicensed allocation channelization
- Part 94 Operational Fixed Service (OFS) transition
- PCS licensed providers
- Licensing mechanism

By expeditiously ruling on this proceeding, the Commission will further the progress towards inaugurating PCS.

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[1] User-provided services are voice, data and mixed voice/data services used by individuals and organizations who purchase equipment for their own benefit, without the necessity of a service arrangement with, or payment of air-time charges to, a third party provider or carrier.

II. The FCC Should Unbundle The Decision Process For Licensed And Unlicensed PCS

A vast amount of information has already been presented to the Commission forecasting the array and pervasiveness of new personal communication services. The three most visible new offerings are:

1. Wireless Business Exchanges (WPBX) for digital wireless connectivity to business systems providing communications within a building or campus;
2. Personal Telecommunications Services (PTS) for providing wireless public access to the switched network;
3. Data-PCS for high speed wireless data communications between personal computers and computer systems.

They all have a common denominator of personal mobility, but each of these services also has unique characteristics and requirements. The characteristics vary by diverse elements such as market applications and terminal ergonomics, while the technical requirements differ by frequency bandwidth and bit error rate.

ROLM strongly urges the Commission to separately evaluate the appropriate rulings for these services. Some of the more complex issues, such as, public switched network access, licensing mechanism and service areas, have different levels of priority within each service. To attempt to make an all encompassing ruling will delay everyone's development efforts and lengthen the time-to-market continuum.

III. The Advancement of Radio-based Personal Communications Is The Communications Vision For The 21st Century

The evolution of communications is predicated on the desire, and importance, of real-time delivery. ROLM concurs with the FCC's definition of PCS as stated in paragraphs 29 and 30 of the above titled Notice. Key words in the description are: 'personal, mobile and portable', without any one of which the essence of PCS is lost. These criteria should be kept in the forefront of any Commission actions as they are essential elements in the next generation of communications.

An example of the trend towards real-time communications is noted by the changes in the delivery mechanisms and time frames of business documents. The United States Postal Service took pride in accomplishing 3 day coast-to-coast delivery. Finding this inadequate, a new industry was fostered - overnight mail. Growth and competitive pressures were catalysts to shortening this period to same day delivery, out of which the facsimile market erupted. Even facsimile is not truly real-time, having to take into consideration the typical manual, indirect delivery of the message to the intended recipient. PCS innovators envision wireless business systems as the logical next phase towards real-time communications. Systems are being developed which

will be "person specific" with person-to-person logical connections, as opposed to today's networks with "location specific" terminal-to-terminal physical connections.

The Commission has recognized the trend and the value of this evolutionary process. This is reflected by the issues and positions put forward in this and previous PCS and emerging technology proceedings. PCS will compliment America's leadership in telecommunications, digital trunked radio and computer innovation. The social and economic benefits of PCS will be experienced by all segments of society and all geographic regions.

Even in these recessionary times, the cellular and paging industries, which are specific segments of PCS, are experiencing continual growth. The Cellular Telecommunications Industry Association recently announced its latest statistics on the cellular industry's growth and subsequent benefit to the country's economy. The number of subscribers grew to nearly 9 million, bolstered by the largest six month increase of 1.3 million users; a growth rate of 17%. This was coupled with a 19% increase in revenue for the period and annual revenue of $6.7 billion; up 32% from the previous year. Furthermore, in addition to increasing its subscribers, industry employment grew by 4000

jobs[2]. This is a clear indication of the growing acceptance and value of mobile, personal communications.

Telecommunications is the life blood of today's business world. Customers are unforgiving when it comes to the reliability and quality of their business communication systems. If companies are to incorporate a wireless capability which will have an impact on business procedures and practices, how they interact with their customers, changes in work habits, modifications in work flow, changes to telecom support groups, then the reliability of the new technology must be equivalent to that of wired service. The work being done at ROLM provides a high confidence level that this standard of performance is attainable. Undoubtedly the other equipment manufacturers, for these unlicensed services, are also sensitive to this quality requirement.

IV. The FCC Should Support Mutual Co-existence Of Unlicensed Devices Via A Spectrum Etiquette

A critical consideration in the design and implementation of business communications is the ease of installation and expansion. A licensing procedure for U-PCS will put an undue burden on users and vendors. Since on-premise applications

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[2] Radio Communications Report, September 14, 1992.

do not follow the conventional guidelines of mobile service, they should not be subjected to the same procedures and processes. Because these services can be made self-managing, the equipment should only be required to meet equipment authorization which will validate regulatory performance compliance.

ROLM is pleased the Commission intends on allocating frequencies for unlicensed applications. By not rigidly structuring the unlicensed band, there is potential for intersystem interference leading to market chaos. Recognizing that unmanaged spectrum usage would be industry suicide, ROLM favors an industry established mechanism, or better yet, a technology etiquette for sharing the band among authorized U-PCS systems. This etiquette should provide for fair access and mutual coexistence among all users. Adherence to such an etiquette should be adopted by the FCC as part of the equipment authorization criteria.

In support of this approach, ROLM has joined with other telecommunications and data communications vendors in the formation of the Wireless Information Networks Forum (WINForum). A high priority and significant amounts of resources are being individually and collectively devoted to defining this spectrum etiquette.

There are four primary objectives of the etiquette:

- Minimal regulation required to insure its usefulness;
- Mutual coexistence of conforming systems;
- Spectrum efficiency;
- Inexpensive implementation.

Technical considerations of the etiquette will include:

- Power limits;
- Time limits;
- Frequency limits, i.e. bandwidth;
- Dynamic access, i.e. Listen Before Transmit.

ROLM is pleased with the vision and progress that WINForum has been able to achieve in the structuring of the etiquette. Individual corporate biases and agendas have been placed secondary to the industry's goals. It is hoped that the Commission will not repeat mistakes of the past, in attempting to institute its own technology parameters but alternatively, will recognize the industry consensus behind this approach. The U-PCS community will benefit by the Commission including this etiquette as part of the criteria for equipment authorization.

Considering the critical nature of equitable sharing of this allocation, it is ROLM position that any channelization scheme for the band should be driven by the etiquette, not visa versa. Besides retarding the free consideration of all approaches to the etiquette, a channelization plan championed by the FCC could influence technology standards, i.e. bias one technology versus another. By not giving

developers sufficient latitude in spectrum usage, innovative implementations may be stifled. Therefore, technical flexibility is desirable.

It is hoped that a common etiquette will allow an equitable co-existence of voice and data services. There are some uncertainties about whether this is technically achievable and what the economic consequences may be. As discussed later, the potential unfeasibility of one band with one etiquette is additional justification for more bandwidth.

V. The Number of PCS Licensees Should Be No More Than Three

Being sensitized by our own industry to the benefits and drawbacks of competition, ROLM believes that three licensed providers is the maximum number in each service area. This position was arrived at after considering four factors:

- Adequate spectrum for U-PCS;
- Provision for inter and intra-market competition;
- Opportunity for a profitable business;
- An allocation scheme which is conducive to co-existence with, or the transition of, fixed microwave service.

The Commission's past actions to induce competition and encourage innovation have been balanced so as not to dilute the market opportunities nor punish the pioneer. The same

approach needs to be applied to the emerging licensed PCS (i.e. Personal Telecommunications Service -- PTS) market.

a. Inter and Intra-market Competition

Over the past several decades, both the American consumer and the business sector have been beneficiaries of FCC actions which have stimulated competition within a particular market. One needs only to look at the Commission's activities relating to the telecommunications industry for recent examples -- choices in long distance carriers and multiple air-to-ground service providers. This competition has resulted in lower tariffs, improved quality of services and expanded products. The competition has not only been beneficial to the end-users, but has also been an economic catalyst by stimulating advances in technology and equipment, which has resulted in increased job opportunities.

PTS licensees will be direct competition to the cellular duopoly, which is coming under increasing examination because of its apparent lack of competitive pressures. With two or three PTS licensees, there will be natural inter-service and intra-service rivalries which will enhance expectations for coverage, pricing, grade of service and equipment capabilities.

b. Opportunity for a Profitable Business

The costs associated with the implementation of PTS, on a per market basis, are expected to be on the same order of magnitude as the cellular buildout and cable TV deployment -- tens-of-millions of dollars[3]. The infrastructure costs will only be a portion of the total expenses. License holders will require significant dollars for marketing, sales and service organizations, administrative and management expenses and the unknown microwave transition costs. PTS deployment will require financial resources well beyond all but a very limited number of companies.

Financing PTS will be an arduous task. Financiers will scrutinize the market opportunities and potential competitors. Considering the foreseeable economic climate, it is felt that there will only be enough capital for a small number of participants in any market.

Crowding the field of PTS players will be competitors from Enhanced Specialized Mobile Radio, 900 MHz PCS providers, two cellular providers and, eventually, large and small low earth orbiting satellite services. Therefore, the FCC will do a disservice to the industry by awarding more than three licenses, since each will be competing for the same finite

[3] Today's cellular infrastructure is estimated at 8000 cell sites, costing $15 Billion.

investment dollars and potential customers. Too many providers will dilute the market, increase the cost per subscriber for service and reduce or extend the profitability potential. In this instance, the old adage of "Too many cooks will spoil the soup" is likely to hold true.

c. An Allocation Scheme Which is Conducive to Co-existence

The industry has previously presented many studies and a great deal of information regarding the potential for, or against, co-existence of PCS with the incumbent microwave users. Regardless of who is right, the Commission has wisely taken the position that the licensed allocation pairing should be parallel with the current 2 GHz plan. It is obvious that the proposed 80 MHz separation, between transmit and receive channels, will facilitate planning and simplify negotiations with the microwave users. Anything not consistent with this approach to frequency pairing will likely delay PTS deployment and increase the complexity of OFS transitions.

VI. The Proposed 20 MHz For Unlicensed Devices Is Inadequate -- Additional Spectrum At 1895 MHz

According to recent estimates by the US Department of Labor, there are approximately 117 million Americans in the

business sector. Additionally, Northern Business Information estimates that the 66 million centrex, PBX and key system telephone lines will grow to 71 million in 1995[4]. Even though U-PCS is envisioned as primarily targeting these individuals, additional users will be found in classroom applications, peer-to-peer communications and other nontypical business uses. For a service to address approximately 40% of the country's total population, the 20 MHz proposed for unlicensed operations is woefully inadequate.

In ROLM's comments relating to ET Docket Number 92-9, a user density model was submitted which demonstrated that a minimum of 40 MHz would be required to adequately meet the demands for only wireless business exchanges[5]. This analysis did not include high and low speed data nor cordless phone requirements, the additional services envisioned by the Commission using the unlicensed allocation[6].

There are additional justifications for allocating more than 20 MHz to unlicensed devices.

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[4] US Key Telephone System Market; Northern Business Information, January 1992.

[5] ROLM Comments Relating to the Notice of Proposed Rule Making, In the Matter of Redevelopment of Spectrum to Encourage Innovation in the Use of New Telecommunications Technology, ET Docket No. 92-9, May 28, 1992.

[6] Notice of Proposed Rule Making, Gen. Docket No. 90-314 and ET Docket No. 92-100. In paragraph 41, wireless PBXs, high and low speed data and cordless phones are identified by the FCC as the unlicensed applications.

1. Presently, cellular licensees are allocated 25 MHz and it is proposed that each licensed PCS provider be allocated 30 MHz. It is generally accepted that these licensees are/will be providing primarily narrowband switched service within their allocations.

2. An industry trade association, Telocator, estimates that for Wireless PBX/Advanced Cordless telephones a minimum of 27 MHz is required, using the assumption of implementation of current technology and an optimistic deployment[7]. This estimate may be conservative relative to individual manufacturers' service models. Furthermore, the Telocator estimate does not include spectrum for wireless data.

3. WINForum is on record asking for a minimum of 40 MHz, with long range forecasts of up to 200 MHz[8].

4. In Europe, 20 MHz has been allocated for DECT voice and low speed data applications. The European Telecommunications Standards Institute (ETSI) did an analysis, in 1988, and determined that an additional 30 MHz is required to accommodate a voice traffic density of 25,000 Erlangs/km^2/floor[9].

5. For HIPERLAN (i.e. HIgh PERformance LAN) an allocation of 150 MHz is being considered by the ETSI for high speed data applications.

6. Apple Computer's Petition for Rule Making[10], eloquently stated the rationale for allocating 40 MHz for DATA-PCS, which did not take into account any requirements for WPBX.

7. A market research study conducted by A. D. Little Company estimated that wireless telephony would have a 20% penetration in business establishments[11].

8. Hatfield Associates, Inc. did an analysis of PCS spectrum requirements and validated a requirement of 30 MHz just for WPBX[12].

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[7] Telocator Spectrum Estimates for PCS Report: An Analysis of Clear Spectrum to Support Emerging PCS Services; TE/92-5-28/076.

[8] Comments of Wireless Information Networks Forum, ET Docket No. 92-9, June 8, 1992.

[9] The European Telecommunications Standards Institute, RES03(92)47, ETR 042.

[10] Apple Computer, Amendment of Section 2.106 of the Commission's Rules to Establish a New Radio Service for Local Area High Speed Data Communications Among Personal Computing Devices, RM. - 7618, January 28, 1991.

[11] Arthur D. Little, Co., PCS Delphi Research Project, October 9, 1991.

9. In an ideal world voice and data systems should be able to co-exist in a nondetrimental fashion. This is not an ideal world. The proposed 20 MHz allocation will put technical restraints on both voice and data systems. This minimal allocation will add complexity and ultimately cost to any system. With additional spectrum it may be advisable to subdivide the unlicensed band for voice and data applications. The additional spectrum will not only accommodate the large markets, but also simplify the sharing etiquettes required for each application.

With this industry substantiation, ROLM is requesting that the FCC allocate, at a minimum, an additional 15 MHz from 1895 to 1910 MHz for unlicensed devices. Without this additional spectrum there is serious concern that all users will experience a continuing degradation of service as the market expands, the sharing etiquette will be expensive to implement (or may not be achievable) and that yet unforeseen services will be handicapped or abandoned.

VII. The Part 94 Transition Out Of The Unlicensed Allocation Needs To Be Expedited

Clear spectrum is ultimately required for the successful implementation of unlicensed devices, all operating within the boundaries of a technical etiquette for spectrum sharing. There is a high probability that a process will need to be in place whereby the current OFS licensees are

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[12] FMR Reply Comments, Amendment of the Commission's Rules to Establish New Personal Communications Services, GEN. Docket No. 90-314, Jan. 15, 1991; also FMR Corp. Experimental License Report, July 1991.

transitioned to alternative frequencies or transmission media. Working within various PCS industry forums, ROLM has promoted and recognized a consensus commitment to an equitable and reliable transition of these essential services.

a. Who/What Is Affected?

An analysis needs to be made on the number and priority of potential microwave links which may be affected by U-PCS. It is ROLM's belief that only a limited number of the microwave links will be impacted by new services operating in this band. This belief is based upon several points.

First, these services will first be introduced in high density metropolitan areas. This is a solid assumption because services will be offered where the people are. Several documented studies show that except for a very small number of metropolitan areas, there is an abundance of unlicensed spectrum in the total 1850 MHz[13] band. Second, some of the services, such as WPBX and Data-PCS, will be operating within buildings, where it is generally accepted that 10 dB of attenuation will be realized due to the walls, ceilings and superstructure.

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[13]. American Personal Communications Frequency Agile Sharing Technology (FAST) Report on Spectrum Sharing, July 1991. Also, Reply Comments of Digital Spread Spectrum Technologies, Gen. Docket No. 90-314, January, 1991.

The next step is an analysis of the replacement costs of the affected microwave links based on the most reliable alternatives. Hopefully, the FCC and the National Telecommunications and Information Administration (NTIA) will have reached agreement on accommodating the most complex transition requirements into the 1710 to 1850 MHz band. ROLM would like to reiterate its advocacy of this option[14].

b. How Is The Migration Administered?

An entity must be formed or expanded to handle the OFS transition negotiations on behalf of the unlicensed industry. This entity could be a commercial enterprise already working in the microwave industry. Preferred alternatives include a PCS trade association or a consortium of PCS organizations.

The transition organization, in some respects, would operate along the lines of frequency coordinating bodies presently functioning in the private land mobile radio industry. The Commission often uses frequency coordinators to assist in coordinating shared spectrum usage. In the Conference Report accompanying the Communications Amendments Act of 1982, it

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[14] *ROLM Comments Relating to the Notice of Proposed Rule Making, In the Matter of Redevelopment of Spectrum to Encourage Innovation in the Use of New Telecommunications Technology, ET Docket No. 92-9, May 28, 1992, page 20.*

stated that "frequency coordinating committees not only provide for more efficient use of the land mobile spectrum, but also enable all users, large and small, to obtain the coordination necessary to place their station on the air."

Regardless of the legal structure, the negotiating entity would be open to all parties interested in participating in the unlicensed services. This organization must be empowered by the FCC to collect a transition royalty and possibly assist in frequency coordination or disputes. This authority could be authorized under Section 332(b)(1) of the 1934 Communications Act.

The entity will require expertise in the following areas:
- Microwave service & maintenance;
- Finance and accounting;
- Regulatory affairs and rulings;
- Legal and contract expertise.

All unlicensed equipment will be FCC authorized, which will require certification of payment of a transition royalty. Equipment authorization will also require compliance with the spectrum sharing etiquette, power limitations, channelization plan and any other FCC criteria. For audit or violation purposes, a universal identification code would be assigned, by the negotiating entity, for each transceiver upon payment of the transition royalty.

c. How Is The Transition Funded?

The negotiating organization would be responsible for collecting the transition royalty in association with assignment of the identification codes. It is likely that substantial funds will be needed early in the process. There are at least 2 approaches to initially funding the early transition costs:

1. Industry vendors would contribute "up front" funds to an account for credit towards a future royalty on type certified equipment. An incentive for contributing could be a 2:1 ratio of credit to contribution.

2. A financial institution would float a bond for the transition costs. The bond is paid down by the transition royalty paid in conjunction with equipment authorization.

d. The FCC's Role

It is envisioned that the Commission be an overseer of the process and a arbitrator of disputes. But in the ruling for unlicensed devices, the FCC needs to insure that all vendors, present and future, equitably contribute to the migration expenses of the OFS licensees. In order to prevent a new service from being held hostage to exorbitant transition settlements, the FCC needs to establish compensation guidelines which prevent OFS licensees from receiving windfall "profits" from the transition process.

VIII. Local Exchange Carriers Should Be Eligible For PTS Licenses

In paragraphs 73 and 74 of this Notice, the Commission has stated several compelling reasons for allowing local exchange carriers (LEC) to participate in the PTS process. One only has to consider the extensive infrastructure the LECs have developed, which will prove invaluable in fulfilling the goal of ubiquitous coverage. More importantly, the LECs have established a standard of excellence, admired worldwide, for service performance.

ROLM does recommend that appropriate structural (i.e. separate subsidiaries) and nonstructural (i.e. cost allocations) be adopted to minimize the potential for anticompetitive practices or cross subsidization. Furthermore, the primary service provided by the LECs must be equivalent to that offered by other non-LEC licensees. Specifically, the authorization is for personal, mobile service and wireless and a local loop implementation should only be permitted on an ancillary basis.